

PITCHER PLANTS

DIFFERENCE of opinion has been expressed as to the nature and use of the liquid found in the so-called pitchers of various plants, such as *Nepenthes*, *Rafflesia*, and certain *Orchidaceæ*. The popular idea that these curious receptacles collect pure water for the refreshment of the thirsty in arid places, would seem to be set at rest, by a consideration of the fact that these plants grow in moist and marshy places. There would seem, moreover, to be some improbability that plants should secrete pure water.

In this country, where these plants are grown under exceptional conditions, there is some difficulty in settling these questions experimentally. In such cases, extraneous water often finds its way into the pitchers, so that several ounces may frequently be gathered from a single receptacle of *Nepenthes*, the greater part of which is accidental.

In August last I had an opportunity of collecting the liquid from two flowers of *Coryanthes*, one of the *Orchidaceæ*, which had just opened, in one of the well-known stove-houses of Mr. Wilson Saunders.

Though the quantity collected was small, amounting only to about three cubic centimetres, or 1·18 cubic inches, an examination showed the following properties:—

Clear and somewhat glutinous in consistence. Possessed of a high refractive power, and a specific gravity of 1·062.

Odour pleasant but faint, becoming more marked by a gentle heat. Neutral to test papers. Becoming milky, by concentration on the water-bath, it finally yielded a transparent gum, insoluble in alcohol.

Oxalates produced no precipitate of lime, but basic lead acetate gave a curdy reaction. Concentrated hot sulphuric acid blackened the liquid.

Although the taste was not acrid, the mawkish flavour would render it quite unpalatable.

This examination therefore proved the liquid to be something else than pure water.

100 parts of liquid contained:—

Water and volatile oils . . .	98·51
Non-volatile residue . . .	1·49

100·00

G. B. BUCKTON

SPECTROSCOPIC OBSERVATIONS OF THE SUN

PROF. C. A. YOUNG has obligingly sent me an account of his recent work, which is very rich in promise, as he tells me that he has now the dispersive power of 13 prisms of heavy flint, each with an angle of 55°. It is now some time ago since I announced to the Royal Society that over soots prominences, built up of different vapours, were sometimes observable by means of their lines, *bright and thin*, overlying the thick absorption lines in the spot spectra. This observation is, I hold, a clear proof of the truth of the theory put forward by Dr. Frankland and myself, namely, that changes in spectra, notably the thickening of the lines, are due to pressure, and not to temperature; for according to the theory of exchanges, the bright prominence must be hotter than the absorbing vapour which underlies it, and still the lines are thinner.

Dr. Young has now observed these phenomena with exactly the same result. He writes to Professor Morton:—

"I write to inform you that last Thursday, Sept. 22, about 11 A.M. Hanover mean time, I was so fortunate as to see the sodium lines D_1 and D_2 , reversed in the spectrum of the umbra of a large spot near the eastern limb of the sun. At the same time the C and F lines were also reversed, but with the great dispersive power of my new

spectroscope I see this so often in the solar spots, that it has ceased to be remarkable.

"The figure gives the appearance of the sodium lines. In the umbra of the spot the D_3 line was not visible, but in the penumbra was plainly seen, as a dark shade, represented in the figure.

"I am not aware that this reversal of the sodium lines in a spot spectrum has ever been observed before; its reversal in the spectra of prominences is not very unusual. A small prominence on the western limb of the sun, which was visible the same forenoon, presented all the following bright lines, viz.: C, D_1 , D_2 , D_3 , 1474', b_1 , b_2 , b_4 , 1989'5, 2001'5, 2031', F, 2581'5, 2796', and H; 15 in all.

"In the spot spectrum the magnesium lines b_1 , b_2 , and b_4 were not reversed, but while the shade which accompanies the lines was perceptibly widened, the central black line itself was thinned and lightened."

Further, Prof. Young has succeeded in obtaining photographs of protuberances on the sun's limb, of which he has been good enough to forward me a specimen. They were obtained by attaching a small camera to the eye-piece of the telescope and opening the slit somewhat widely, using the hydrogen line near G. He adds:—"As a picture, the little thing amounts to nothing, because the unsteadiness of the air and the maladjustment of the polar axis of the equatorial caused the image to shift its place slightly during the long exposure of three-and-a-half minutes which was required, thus destroying all the details. Still, the double-headed form of the prominence is evident, and the possibility of taking such photographs is established."

In a letter to myself Prof. Young adds:—"I should not have published so imperfect a success were it not that my engagement as a member of Prof. Winlock's eclipse party prevents me from following up the matter at present. The experiments were tried on the 28th, and on the 30th the equatorial was taken down to be packed up and sent to the rendezvous, at Alvan Clark's factory, where all the instruments are collected and put in order previous to sailing."

J. NORMAN LOCKYER

NOTES

SINCE our last issue the Joint Committee of the Royal and Royal Astronomical Societies and the Council of the British Association have met to consider the question of the Eclipse Expedition, and in consequence of these meetings Mr. Gladstone has been asked to receive a joint deputation to urge upon the Government the importance of the proposed expedition. The Joint Committee have appointed the Presidents of the Royal and Royal Astronomical Societies, the Astronomer Royal, and Mr. Lockyer to plead its cause; while the Council of the British Association will be represented by the President and officers of the Association, Sir John Lubbock, M.P., and Dr. Lyon Playfair, M.P. Up to the time of our going to press, however, no time had been fixed for the deputation to wait upon the Prime Minister.

THE medals in the gift of the Royal Society have this year been awarded as follows:—The Copley medal to Dr. Joule; the Rumford medal to M. Descloiseaux; and the Royal medals to Prof. W. H. Miller and Mr. W. Davidson.

PROF. SIMON NEWCOMB has arrived in this country from the United States Naval Observatory. His mission among us is to examine and report on the great Newall telescope. He will then proceed to Gibraltar to observe the approaching eclipse.

ALL members of the British Association will be concerned to learn that Dr. Hirst feels called upon by the pressure of his new duties to resign the General Secretaryship of the Association, an honorary post which he has long filled with the greatest advantage to Science.

AMONG the mass of correspondence which has recently reached us are several interesting letters on early notices of the Aurora, for some of which we hope to find room next week.

WE rejoice to see several men of science, with Professor Huxley at their head, coming forward as candidates for the London School Board. We shall be glad to be informed if this example is followed elsewhere.

WE read in the *Echo* that the Electric Telegraph has been put to a new use in Canada. At Mimouski, when the late earthquake came upon them, they sent at once to Quebec, a distance of 200 miles, to ask, "How do you feel?" While the operator there was at his work the shock arrived. He at once sent to Montreal, about 200 miles further on, to ask if they had felt it. They had just time to say "No" before the earthquake came up.

THE new buildings of the Glasgow University were formally opened on Monday last. The proceedings were conducted within the Hunterian Museum. The Duke of Montrose, Chancellor of the University, presided, and congratulated the principal professors upon the success which had attended their efforts, and that they had lived to see the opening day of the new University. The merchants of Glasgow had made princely fortunes, which was creditable to their talents and their industry; but it was still more creditable to them that they had made such a use of their riches as to enable this noble building to be erected for the education of the rising generation. After Prof. Lushington had delivered an address, Mr. A. Orr Ewing, M.P., stated that from subscriptions and from Government 254,000*l.* had been obtained, and 117,000*l.* had been received for the ground upon which the old college stood. Everything in connection with the new building was paid. Of the 150,000*l.* in public subscriptions, Glasgow had given nearly all. The various classes met on Tuesday.

WE believe that Mr. W. Spottiswoode will succeed the late Dr. W. A. Miller as Treasurer of the Royal Society.

On the 15th inst., Dr. Grey will read a paper at the Statistical Society "On the Claims of Science to Public Recognition and Support." We are glad that the attention of such a powerful body as the Statistical Society is to be so authoritatively drawn to such an important subject.

THE Polytechnic School of Zürich has been suddenly deprived of its chemical teachers. In addition to the death of Prof. Bolley, which we have already recorded, Prof. Hädeler, giving way to the demands of failing health, has relinquished his chair of Pure Chemistry.

It was recently determined to erect a statue to Prot. Morse, the eminent American electrician and inventor of the telegraph which bears his name, and for this purpose subscriptions were opened in the States. The full amount has been very speedily subscribed, and the erection of a marble statue is to be at once proceeded with. It is to stand in the Central Park, New York, a suitable position having been willingly granted by the Commissioners.

It is a question of some interest and curiosity how to compare the forces of steam and gunpowder. The following calculation, each step of which can be easily followed, may therefore be acceptable to our readers. The force exerted by an exploding charge of powder in a gun requires for its calculation two considerations, *viz.* the amount of force given to the shot, and the time in which that force is imparted. Taking as our example the 300-pounder Woolwich gun, the first element of the calculation is as follows:—One steam horse lifts 33,000*lb.* one foot in one minute, or 550*lb.* in one second. The 300*lb.*

shot leaves the muzzle of the gun at the rate of 1,300 feet per second. Let *H* represent the force in horse-power in the shot, then, by the well-known equations $W = \frac{1}{2} m v^2$, and $m = \frac{w}{g}$,

$$H \times 550 = \frac{300}{2g} \times (1,300)^2 = \frac{300}{64} \times 1,690,000, H = 14,403.409$$

The force, *i.e.* the work in the shot, is therefore measured by 14,403.409 horse power. That is, it would require that amount of horse power acting for the space of one second to give to a 300*lb.* shot the velocity with which it is driven from the gun by the explosion of the charge (43*lb.* of gunpowder). But this is done by the powder during that minute portion of a second in which the shot moves down the bore of the gun. The results of Captain Noble's chronoscope make it appear that this time is somewhat less than one two-hundredth part of a second. The force exerted by the powder must, therefore, be $14,403.409 \times 200$: that is, 2,880,681.8 horse power. Some comparatively small considerations, as the friction of the shot in the gun, are neglected in this calculation. It does not, therefore, err in excess, and is sufficient to give some idea of the enormous force exerted. Nor is it uniformly exerted throughout the whole time of the shot's movement in the gun, nor does the calculation above made necessarily give the greatest intensity of action. This much we may state, that at some instant during the 200th part of a second in the case taken, the force of the expanding gas was to be measured by nearly three million horse power.

THE unpublished manuscripts left by the late Sir James Simpson on the important subject of Hospitalism have been confided to the care of Mr. Lawson Tait, of Birmingham, for completion and editing.

IN addition to the outbreak of the long-quiet volcano of Tongariro in New Zealand, to which we lately called attention, we hear from American sources that "a volcano, near San Rafael Valley, Lower California, which has been in a dormant state for years, has commenced a violent eruption, emitting columns of smoke and scattering ashes and cinders for miles around its base. St. Diego telegrams say it is plainly visible from there."

THE islands in the Sea of Okotsch, off the north-east coast of Asia, are being visited by ships in search of seals. A vessel recently arrived at San Francisco from Jones Island, between lat. 52° and 53° and long. 145° and 146°, with 11,500 seal-skins on board, and another vessel with a still larger cargo is expected. This island is half a mile in circumference, and is uninhabited, and is remarkable for the great abundance of seals.

CONSIDERING the many uses to which india-rubber is now applied, one of the most important being its recognised superiority over gutta-percha for deep-sea telegraphs, and remembering the fears entertained some time back of the probability of a decrease in the supply, owing to the exhaustion of the forests consequent upon the immense demand, it is gratifying to learn that the quantity of rubber exported from Para during the past year exceeded that of the previous year by 22,731 arrobas (an arroba is equal to about 25*lb.*), and by 241,250*l.* in market value. It is true that the more accessible rubber districts are becoming exhausted, and give a smaller yield than in former years, but the rubber-bearing country is so extensive, and its rivers so incompletely explored, that the newly-discovered sources will, no doubt, more than make up any deficiency arising from the exhaustion of the old. It is difficult, however, to obtain accurate or reliable information from those engaged in the collecting of the rubber. The continued demand for rubber, which is collected with comparatively little labour, and requires but little skill and experience, absorbs all the attention of the natives over other products, and the constant rise in its value so stimulates its

production, that it is more than probable there will be for some years to come an annual increase in the quantity imported of at least ten per cent.

In the State of Santander, Colombia, one of the most important sources of state revenue is the manufacture of so-called straw hats. These hats are chiefly made in the Bucaramanga district, and are of a very fine and white material, but still not equal to the celebrated Panama hats, as they soon become dirty, owing to the plait not being drawn sufficiently tight. The weekly sale of hats in the above district averages from 600 to 800 dozen, the lowest quality of which fetch about 1*l.* 4*s.* the dozen, and the finest quality often realising as much as 1*l.* 10*s.* to 1*l.* 16*s.* each. These latter are principally made near Zapatoca, which also has a large trade, but not to the same extent as Bucaramanga. They are for the most part exported to Havana and the United States, where there used to be a great demand for them, but now the trade seems to have somewhat diminished. In the first half of last year 250 cargoes were exported, and as each cargo contains 1,200 hats, some idea may be formed of the large quantities manufactured. The above is gathered from a report on the industrial resources of the State of Santander. The hats referred to are described as being made of a white kind of "straw." We have not seen any of the actual material, but think, in all probability, the so-called straw may be the split leaves of some palm, perhaps *Thrinax argentea*, which was imported in considerable quantities some years ago, and manufactured at St. Alban's into "chip" hats.

THE astronomical and meteorological observations made at the United States' Naval Observatory during 1867 have just been published in a large quarto volume. There is an appendix of reports on the observations of the total eclipse of the sun of Aug. 7, 1869, the various phases of which are beautifully illustrated by chromo-lithographs, and the various instruments made use of are particularly described.

A PIECE of meteoric iron fell on the 18th of September last near Santa Clara, California, in the barn-yard of Michael Sanor, where it set the straw and debris on fire. When picked up it was exceedingly hot, and hissed when thrown into water. The meteorite which fell in October 1869 in Stewart County, Georgia, will be analysed, and a full description of its fall and accompanying phenomena given in the next number of *Silliman's Journal*, by Prof. Willet.

IN consequence of the depression caused by the war, the private enterprise for working coal near Manita in Asia Minor has been postponed, but the Government is taking measures at length for working the coal formations near Constantinople for the artillery factories, carried on under the direction of Messrs. Siemens. This coal was known and worked seventy years ago, as described in old books of travels, and then abandoned. The Heraklea coal mines are going on slowly.

THE Government of India is now cooling in its reduction fit, consequent on the supposed deficiency in the Budget, and is paying more attention to the discharge of its duties. The appointment of an assistant curator for the Geological Museum of India has been authorised, and an increase allowed for the literary purposes of the department.

IT is reported from that interesting region, the Argentine States, that two enormous fossil skeletons have lately been discovered at Fray Bentos, but they are so large as to be beyond the local means of transporting them with safety.

A GREAT earthquake has taken place in the town of Santo Tomas, the capital, and in the district, of Chumbivilcas, department of Cuzco, Peru. On the 10th of July, about 1.30 P.M., it was felt as the people were coming out from mass. The upper part of the two side towers of the church fell in, the vaulted roof was

rent, as well as the walls, and much more damage done. Other damage also took place in the town and district. On that same day the River Santo Tomas, which runs about a league to the west of the town, suddenly rose and overflowed its banks, producing great destruction to the farms, horses, and cattle, but no lives were lost. It was afterwards ascertained that by force of the shock the waters of the Lake Quenacocha had broken out into the river. The lake is about 20 miles in circumference, and lies at the base of the western chain of the Andes. In the town of Ccolquemarca, the tower and body of the church were injured, and many houses overthrown. Up to the 12th the earthquakes were felt every few minutes, at least every quarter of an hour, and the river was still flooded. On the 13th August there was a slight earthquake in the evening at Lima. On the 27th August an earthquake was felt in Chile—we presume at Valparaiso.

EFFORTS are being made to obtain improved instruments and to extend the observations at the Meteorological Observatory at Durban, in Natal.

IN continuation of our comments on the caution necessary in dealing with scientific statements in the Indian press, we may advert to a case in which the Welsh fasting-girl is eclipsed. A correspondent of the *Indian Daily News* at Nuddea affirms that a Sudra woman, forty-five years old, has abstained from food twenty-five years. She bathes twice a day. Of course it is to be added that many natives have satisfied themselves of the correctness of this statement, as many Welshmen did with regard to their fasting-girl.

THE *Inverness Courier* of October 13 states that a number of hollow glass globes of a dark colour, and measuring about eighteen inches in circumference, have lately been found washed ashore at various parts of the coast on the west side of the Island of Lewis. They are hermetically sealed, and have certain characters, such as IV or VI impressed on the sealed part. Some of them are partially filled with a colourless liquid. The question is asked: "Have these been used for some experiment made for the purpose of ascertaining the course of some ocean current?" Can any of our readers throw light on this subject?

IN a recent number of the *Pharmaceutical Journal* a paper appears, by Mr. Cooke, on the Guarana, the seeds of a tree termed the *Paulina sorbilis*, belonging to the order *Sapindaceæ*, and abundant in the province of the Amazonas. The fruit is scarcely as large as a walnut, and contains five or six seeds, which are roasted, then mixed with water and moulded into a cylindrical form resembling a large sausage, and finally dried in an oven. Before being used it is grated into a powder, very like powdered cacao in appearance. Two spoonfuls of the powder are mixed in a tumbler of water, and this drink is regarded as a stimulant to the nerves, and like strong tea or coffee is said to take away the disposition to sleep. The active chemical principle is an alkaloid which Dr. Stenhouse has shown to be identical with theine. Guarana contains more than double as much of this alkaloid as good black tea, and five times as much as coffee, the proportion being 5.07 per cent in Guarana. It is rather a singular coincidence that the same alkaloid should prevail in all the principal substances employed in a similar manner as beverages in different parts of the world, in the tea of China and India, the coffee of Arabia, the cacao of Central America, the maté of South America, and the guarana of Brazil. Guarana is a nervous stimulative and restorative.

AN attempt is again being made, with hope of success, to work the quicksilver mine of Punitaqui, in Ovalle Department, Chile. It was worked for the crown in the Spanish times, but the war of Independence and the Indian incursions stopped it, as the latter did again in 1830.